CAPE HATTERAS NATIONAL SEASHORE
MARINE MAMMAL STRANDINGS
2016 SUMMARY

CAHA 360: Male pygmy sperm whale (alive) that stranded south of Salvo in May.

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ABSTRACT

Cape Hatteras National Seashore (CAHA) experiences high numbers of marine mammal strandings each year, this includes cetaceans (whales, dolphins, and porpoises), pinnipeds (seals), and rarely sirenians (manatees). A below-average number of stranded marine mammals were documented during 2016, including a multitude of species. The total of 37 individuals included a typical high-end Bottlenose dolphin (*Tursiops truncatus*) count – and 8 additional species. The majority of strandings occurred in Hatteras Island and only one stranded alive (euthanized). Given its location on the Outer banks, CAHA continues to be the most likely location of marine mammal strandings; accounting for 62% of all animals on the Outer Banks and 31% of all North Carolina strandings. Two Military Training Exercise events were reported in 2016 corresponding with seven stranded animals; six *Tt* and one *Phoca vitulina* (harbor seal). The less-active stranding year fell below the seashore's 10-year average (54) by roughly twenty animals.

INTRODUCTION

The Outer Banks of North Carolina, known for history, hurricanes, and shipwrecks also happen to be a hotspot for marine mammal activity. Recorded strandings date back to 1884, so it can be argued that the Outer Banks has the longest running record of marine mammal strandings in the world. Thusly, CAHA is a melting pot of species diversity when it comes to marine mammal strandings – given its location on the Outer Banks. The seashore is comprised of barrier island chains that extend into the Atlantic Ocean and come in very close proximity to the continental shelf, and for this reason a large number of strandings occur within park boundaries. At any given time, a wide assortment of marine mammals move-about and feed very close to CAHA beaches, influenced chiefly by the southern Gulf Stream and the northern Labrador Current colliding off our coast.

The seashore has encountered a vast diversity of stranded species as well as few common species that strand more frequently on a yearly basis. This includes a resident bottlenose dolphin population that relies utterly on our coastal environment; long-living individuals can exceed ages of >50 years. One factor affecting this stranding species variation is water temperature. The surrounding water temperatures can vary considerably; warmer temps bringing southern species closer and colder temps bringing northern species closer to CAHA. Collectively, the large numbers of marine mammals are sometimes coupled with outside factors such as persistent fishery operations, strong hurricanes and Nor'easters, active Military Training Exercises, or even zoonosis, leading to high stranding numbers of both live and dead animals.

METHODS

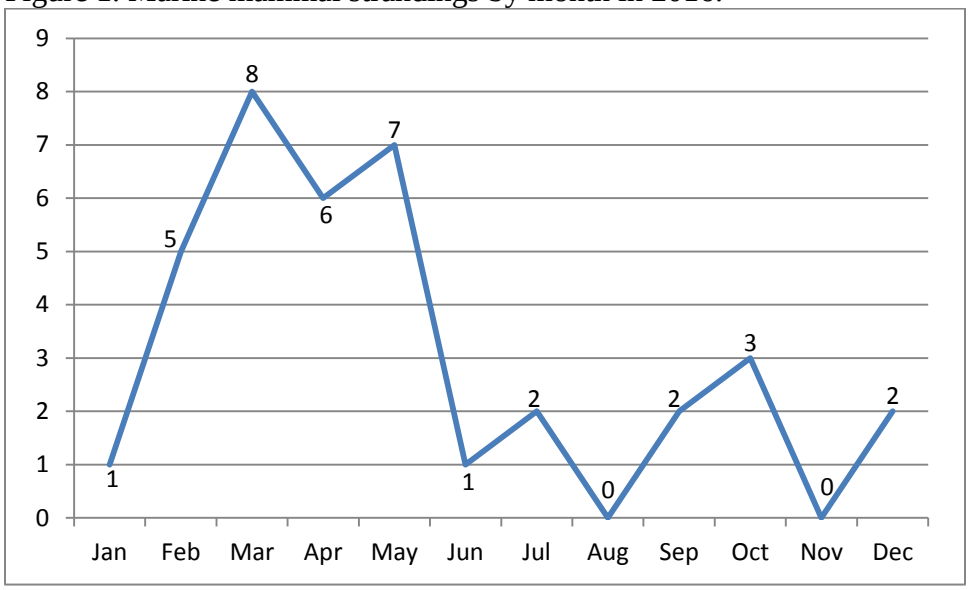
National Park Service (NPS) technicians respond to live and dead marine mammals in CAHA by patrolling the beach regularly using a 4x4 truck or UTV, and conducting walkthroughs on the Pamlico sound side of the islands during fall, winter, and spring. Technicians also receive and respond-to many strandings reported by the general public. This includes reports from the Outer Banks Marine Mammal Stranding Network (OBXMMSN), of which the NPS is also a member. The network is chiefly comprised of the National Park Service and the North Carolina Wildlife Resources Commission, and is governed by the NC State Stranding Coordinator based out of the University of North Carolina – Wilmington.

Collectively, there is potential for any member of the OBXMMSN to assist with any live or dead stranding and/or necropsy event. Given the condition of the animal (generally fresh dead or moderate decomposition), a necropsy will be conducted with the goal of determining any clues as to what contributed to the animal stranding. Various samples are taken from each animal and are eventually transferred to scholastic labs where they are used for multiple graduate research projects and potential publications. In the event of an animal stranding alive, thorough consultations are made via telephone with the appropriate veterinarian, a NOAA representative, and the State of NC Stranding Coordinator before any further action is taken. Generally, due to the animal's poor condition and the lack of rehabilitation facilities, the outcome is chemical euthanasia. Euthanasia procedures are readily performed by trained CAHA technicians or collegiate staff in cases of live large-whale strandings (e.g. humpback or sperm whales). Participating colleges that regularly receive samples from CAHA and assist with large-whale strandings include the University of North Carolina-Wilmington and North Carolina State University.

RESULTS AND DISCUSSION

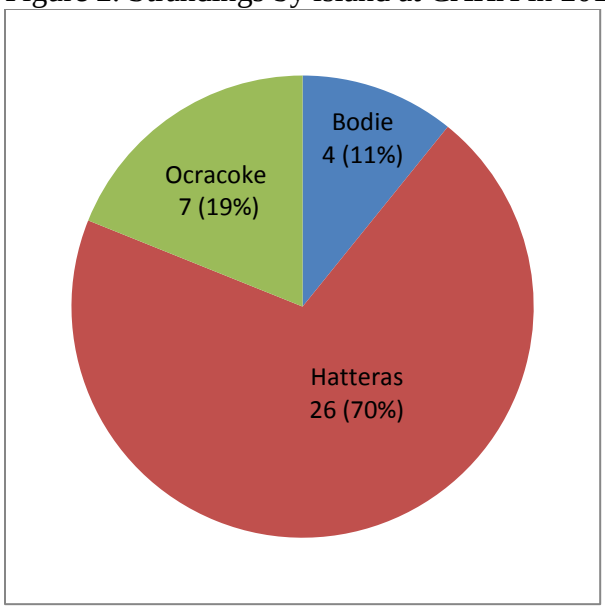
There can be great variation in monthly stranding events at CAHA but the general pattern suggests that the spring months bring in the most animals. During this time, the ocean temperatures are lower and several species (more than 20) have been observed via aerial flights foraging near the outer banks as well as the Gulf Stream. Also, the apex of bottlenose dolphin (*Tt*) calving season occurs in spring and early summer, thus an increase of *Tt* neonates usually occurs at this time. Generally, 1-2 months of the year are stranding-free, and in 2016 the pattern held true (Figure 1). The first third of the year saw an increase in stranding activity (eight at most in March). Soon after, the pattern quickly reversed and very few strandings were documented for the rest of the year.

Figure 1. Marine mammal strandings by month in 2016.



Given its size and characteristic protrusion near the Gulf Stream, Hatteras Island typically encounters the most marine mammal strandings (Figure 2). Both Bodie and Ocracoke Islands showed average stranding numbers and accounted for nearly one-third of this year's animals.

Figure 2. Strandings by island at CAHA in 2016.



The condition in which an animal arrives on the beach determines the level of data collection and sampling that follows. Only 3% of stranded marine mammals experienced advanced/skeletal stages of decomposition in 2016 (Figure 3). This is fortunate in that more advanced sampling (histological, genetic, pathological, clinical, life history) was conducted with the remaining animals thereby giving further insight into potential cause of death or reason for stranding. Only one animal (3%) stranded alive (pygmy sperm whale [*Kb*]), and it was successfully euthanized.

Figure 3. Condition codes of 2016 marine mammal strandings.

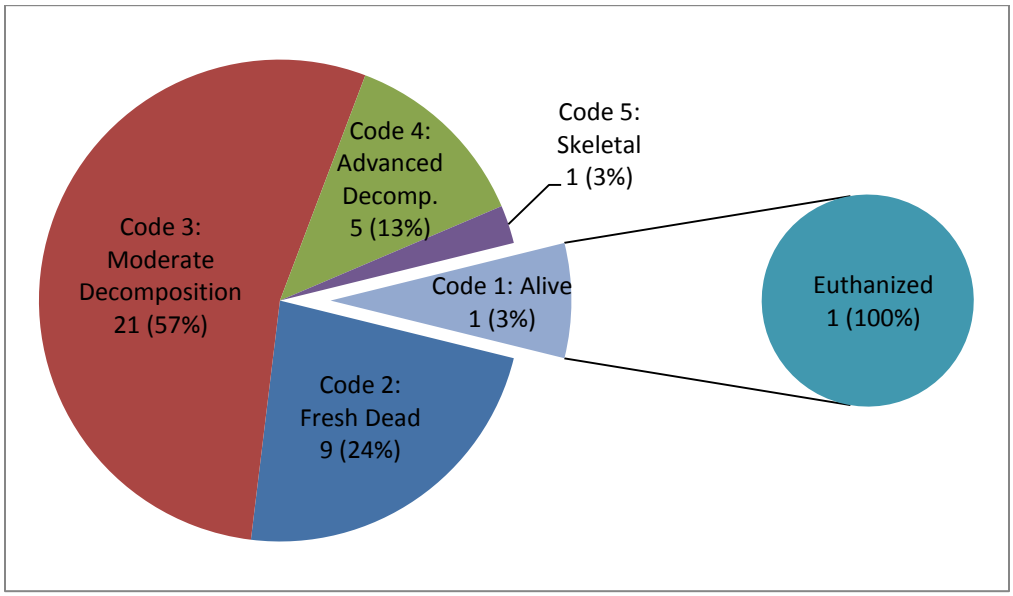
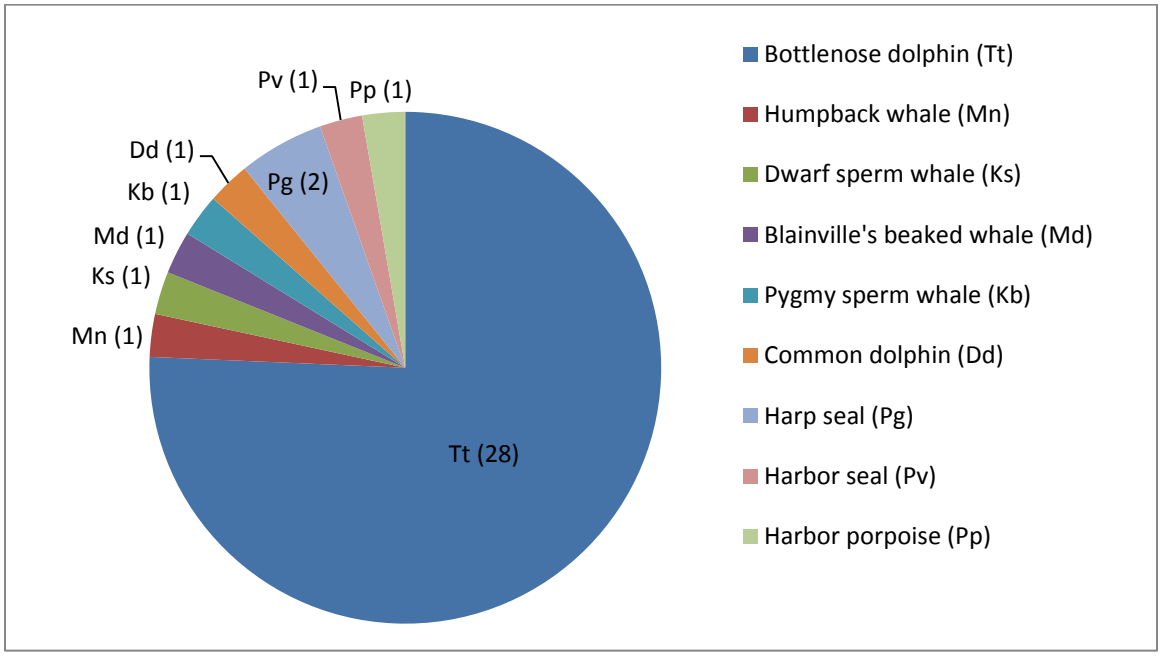


Figure 4. Species diversity of strandings at CAHA during 2016.



An assortment of marine mammals was observed during 2016, the 9 distinct species (Figure 4) is an average number for CAHA but has varied previously from 6-14 species. One yearly trend that remains unchanged is the abundant presence of stranded bottlenose dolphins; 75% of 2016 animals were *Tt*, which is within the normal range for CAHA. While NOAA has not officially declared an end to the dolphin morbillivirus event, it appears the presence of infected animals has greatly decreased. Two pinneped species were documented as stranded in the winter/spring months; one harbor seal and two harp seals with early stages of decomposition (Codes 2 & 3). One large-whale case, (humpback whale [*Mn*]) was also documented.

Figure 5. Comparison of 2016 CAHA strandings to the rest of Outer Banks.

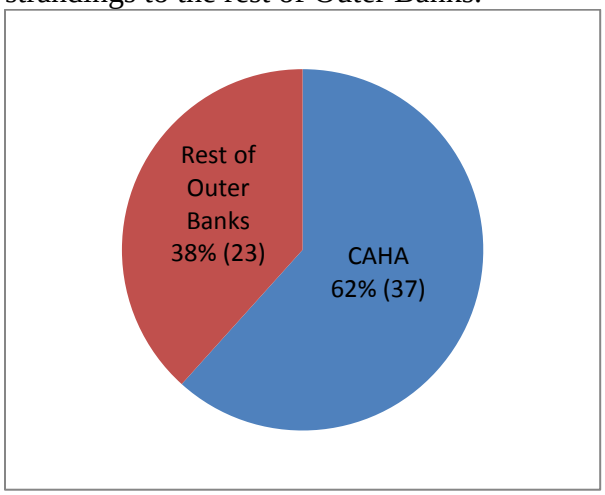
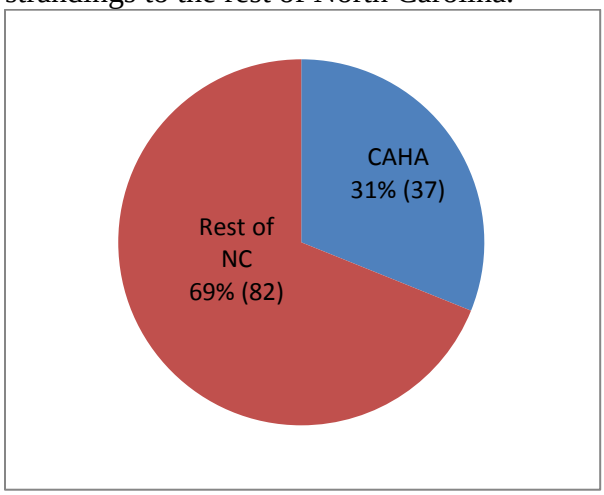


Figure 6. Comparison of 2016 CAHA strandings to the rest of North Carolina.



The marine mammal strandings documented by CAHA in 2016 encompassed the majority of total strandings documented on the outer banks as well as roughly one-third of total North Carolina strandings (Figure 5 and Figure 6). Human Interaction (HI) is one common element that is observed on a yearly basis among strandings, whether or not HI directly contributed to the animal stranding remains debatable. Examples of HI include entanglement (fishery), hooking, ingestion, vessel trauma, gunshot, harassment, or mutilation. Of the total 37 stranded animals in 2016, six of them (16%) showed signs of HI (Table 1.). This is an above-average percentage but is not indicative of overall negative effects humans have had on marine mammals during 2016; these were merely documented cases. All six cases of HI involved bottlenose dolphins.

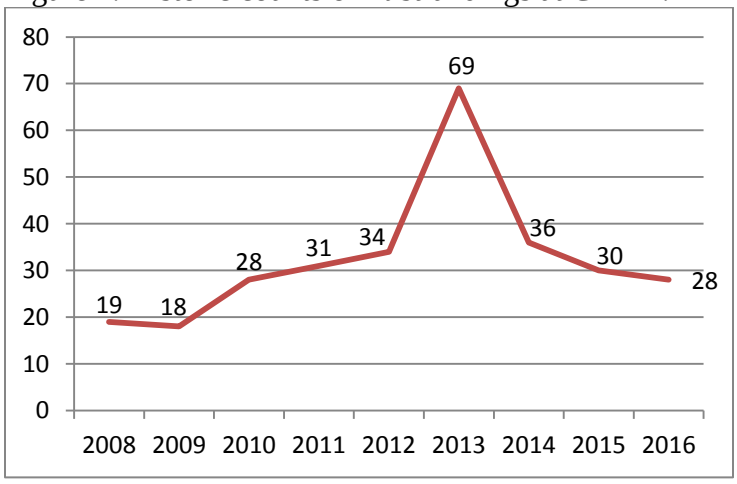
Table 1. Human Interaction cases documented in 2016.

Field ID	**Species**	**Human Interaction Evidence (Fisheries)**
CAHA357	*Tt*	Fluke is severed, also one laceration near point of severing.
CAHA358	*Tt*	Fluke is severed, clean cut at the peduncle. Smaller secondary cut on the ventral peduncle.
CAHA364	*Tt*	Line wraps at rostrum; corresponding wraps from left maxilla to left mandible.
CAHA366	*Tt*	Corresponding HI lesions at left and right mandible; deep and healing.
CAHA371	*Tt*	Fresh line wraps at maxilla and mandible, also at melon and head.
CAHA376	*Tt*	Multiple line wraps and lacerations at appendages and head/rostrum. Ventral laceration with instrument exposing viscera.

Unusual Mortality Event (UME)

As of the end of 2016, the Unusual Mortality Event associated with the morbillivirus strain has not been declared over by NOAA. If not completely ceased, the lab testing for this virus has been limited to very few individuals. The stranding numbers of *Tt* at CAHA has returned to normal levels (Figure 7) and very few dead individuals are showing clinical signs of the virus. At this time, the point at which this UME will be declared "ended" is unknown.

Figure 7. Historic counts of *Tt* strandings at CAHA.



Live Seal Sightings

When ocean temperatures plummet during the winter and spring months, seal sightings are a common occurrence. Coming from the north, the seals migrate along the Outer Banks coast following the colder water while feeding. They will haul-out onto the beach to rest and at this point they become a documentable occurrence. The seals are generally healthy and strict monitoring protocols are followed to safely observe the seal at a distance so as not to alter its behavior. If an abnormality is observed (e.g. poor health, entanglement, broken appendage, open wounds), only then is intervention acceptable. If necessary, a capture and rehabilitation plan is devised and implemented by OBXMMSN members.

In 2016, seal activity occurred from February to April; two species of seals were documented on the shores of CAHA for a combined total of 32 separate sightings. Generally, the most common seal observed at CAHA is the harbor seal (*Phoca vitulina*); 29 individuals were observed. Three harp seals (*Pagophilus groenlandica*) were also observed, this species tends to arrive on the outer banks during coldest sustained ocean temperatures. Gray seals (*Halichoerus grypus*) are less common to this area, none were observed in 2016. A total of 26 sightings occurred on Hatteras Island, and 6 on Ocracoke. Monthly, this can be summarized as 9 in February, 22 in March, and 1 in April. Historically, the south end of Green Island has been used by harbor seals as a haul-out site for consecutive years; therefore a sighting doesn't necessarily imply one individual. Previously, up to 33 seals have been observed on the island, however none were observed in 2016. Dredging and bridge-building equipment has been present at Oregon Inlet for multiple years, which is 0.4 miles from the Green Island haul-out site. The reduction in seal activity in/around Oregon Inlet may be attributed to the large equipment and noise within the 0.3-mile-wide inlet. The new construction project to replace the existing inlet bridge is well under way; thus continuing anthropogenic noise for an indefinite period of time.

Atlantic Fleet Training and Testing (AFTT)

Many varieties of Military Training Exercises (MTE) occur on a yearly basis along the east coast from Virginia to Florida; some include sonar. There is experimental evidence suggesting that anthropogenic sonar disorients and causes harm to marine mammals. The OBXMMSN is notified prior to these exercises and given special instructions if unusual strandings should occur during the MTE. In the case of single stranded animals, NOAA personnel must be notified by text/email but an immediate pager is available in case of emergencies i.e. live strandings, large whale, beaked whale, and multiple (mass) strandings. Overall, CAHA documented seven stranding events that occurred during AFTT events (Table 2), six of which were bottlenose dolphins and one harbor seal.

Table 2. Actual AFTT events and corresponding strandings in 2016.

	2016 MTE Durations and Strandings	
MTE	MTE 1	MTE 2
Duration	3/22 - 4/14	11/25 - 12/21
# Strandings	5	2

Historical Data

Figure 9. Stranding history at CAHA compared to the rest of the Outer Banks.

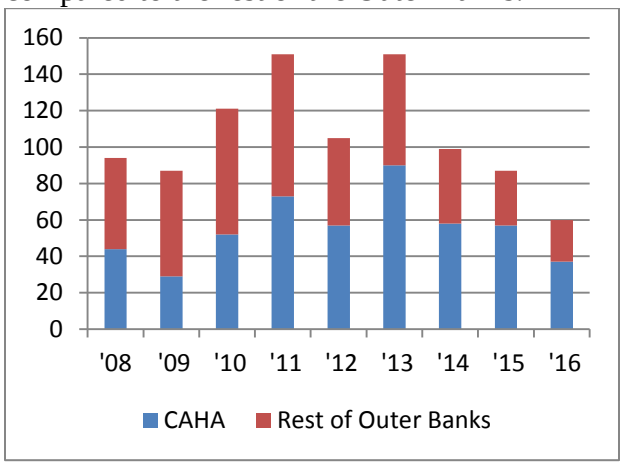
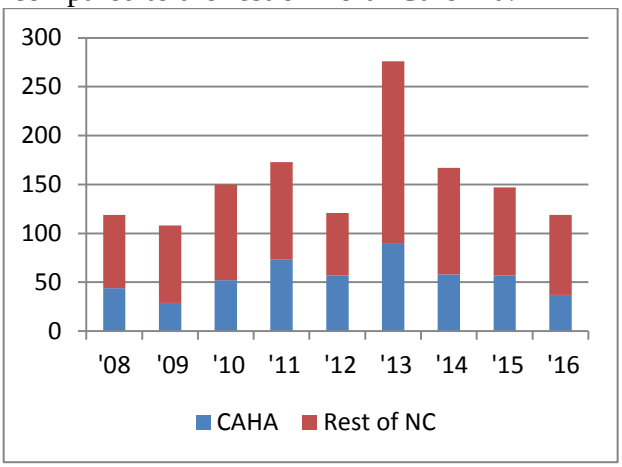


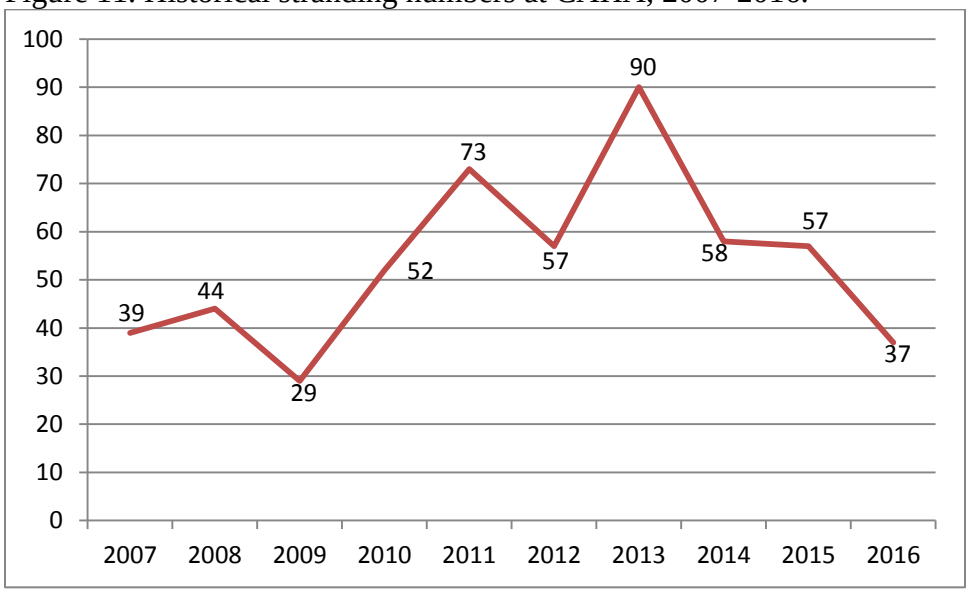
Figure 10. Stranding history at CAHA compared to the rest of North Carolina.



The observed data suggests that CAHA is a major contributor to the overall stranding numbers of the Outer Banks and the state of North Carolina (Figure 9 and Figure 10). Strandings at CAHA account for an average 54 individual animals per year from 2008-2016, while also averaging over half of all strandings on the Outer Banks during this period and one-third of North Carolina's total strandings.

In a 10-year period (Figure 11), it is probable that the trend of generally high stranding numbers will continue with time so long as the geographical characteristics of the seashore remain the same. The average number of strandings over this period is 54 animals per year. The apex of the graph represents the recent morbillivirus UME that claimed an unusually high number of *Tt* individuals.

Figure 11. Historical stranding numbers at CAHA, 2007-2016.



APPENDICES

APPENDIX A: MAPS

Map 1: Bodie Island Marine Mammal Strandings, 2016
Map 2: North Hatteras Island Marine Mammal Strandings, 2016
Map 3: South Hatteras Island Marine Mammal Strandings, 2016
Map 4: Ocracoke Island Marine Mammal Strandings, 2016

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Map 1: Bodie Island Marine Mammal Strandings, 2016

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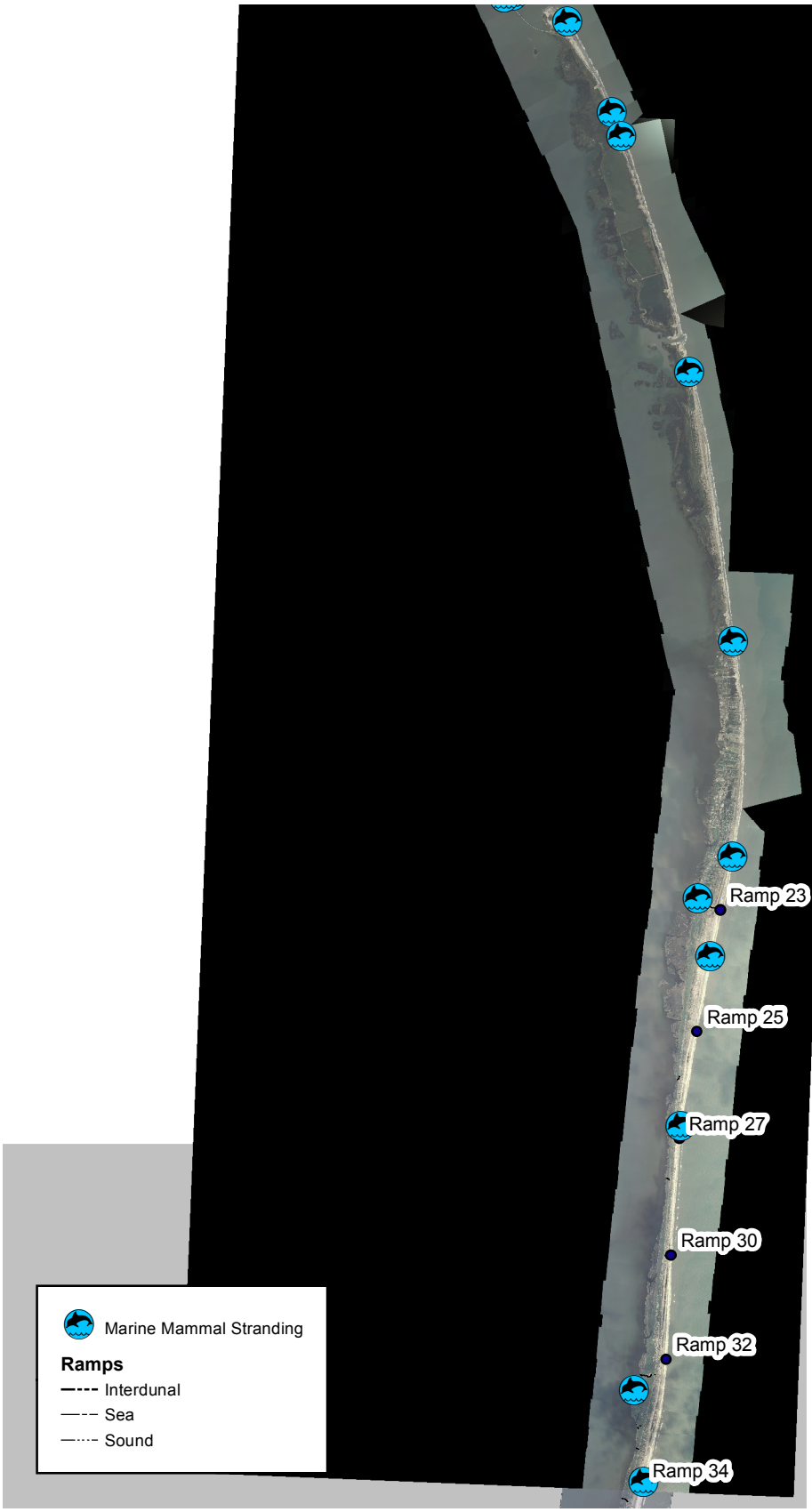
Map 2: North Hatteras Island Marine Mammal Strandings, 2016



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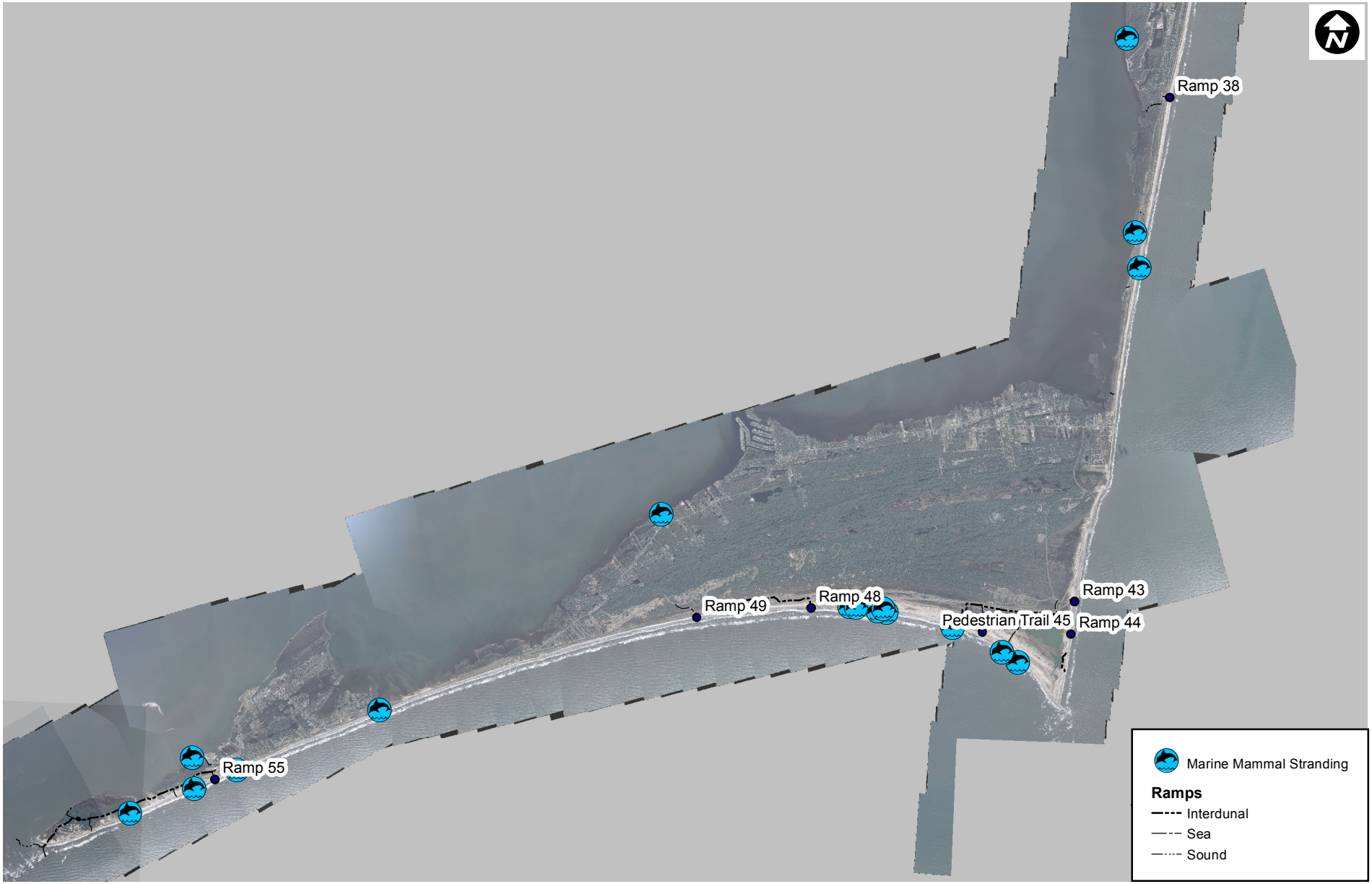
Map 3: South Hatteras Island Marine Mammal Strandings, 2016



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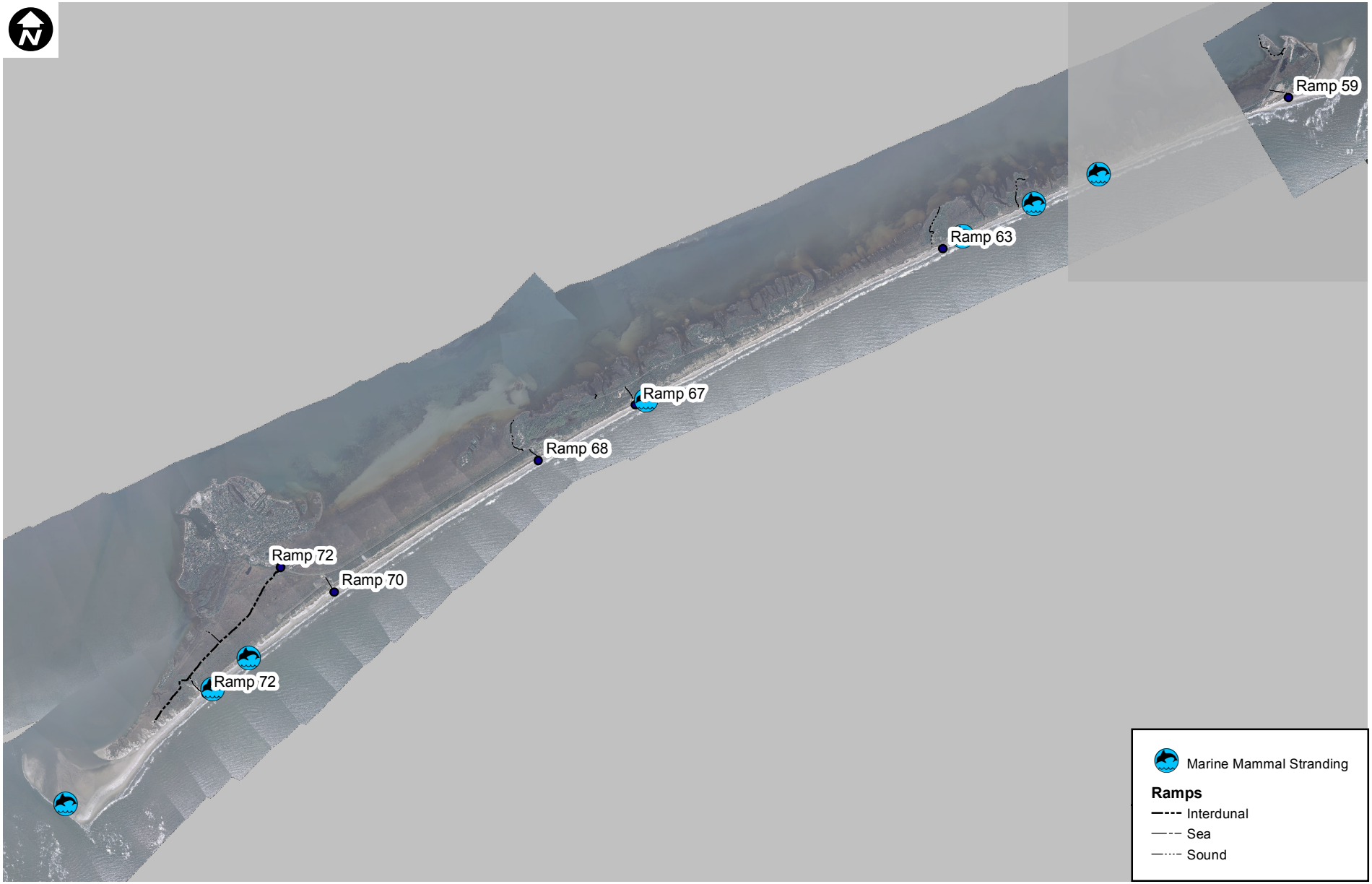
Map 4: Ocracoke Island Marine Mammal Strandings, 2016



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